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**NATURAL HISTORY OF HTLV III INFECTION IN USAF PERSONNEL:  
CLINICAL EVALUATION, LABORATORY EVALUATION,  
ASSESSMENT OF IN VIVO AND IN VITRO IMMUNOLOGIC STATUS,  
AND DATA STORAGE**

**FINAL REPORT**

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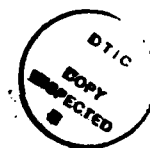
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<p>"Natural History of HTLV III Infection in US Air Force Personnel: Clinical Evaluation, Assessment of In Vivo and In Vitro Immunologic Status, and Data Storage" has been a multidisciplinary, multiyear investigation involving a clinical, laboratory and immunological investigation into the natural history, the study of neuropsychiatric and neurological natural history, and the clinical history of transition from asymptomatic HIV infection to symptomatic disease and frank AIDS. During the period of this project, 989 individuals were entered into the WHMC HIV database. Of these, 645 were Walter Reed stage 1; 122 were Walter Reed stage 2; 47 Walter Reed stage 3; 29 Walter Reed stage 4; 47 Walter Reed stage 5; and 43 Walter Reed stage 6 at initial diagnosis. Fifty-six were of uncertain WR stage. Upon re-evaluation, overall rate of progression to higher Walter Reed stage was approximately 15% per year with a lower number in the Walter Reed stage 1 and 2 and a much higher number in Walter Reed stage 3 through 6 advancing yearly. There was a linear correlation with advanced initial Walter Reed stage and likelihood of subsequent</p>					
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progression to Walter Reed stage 6, or frank AIDS. Areas of investigation included: Natural History, Role of putative viral co-factor infections, Neurological and Neuropsychiatric Natural History, Immunology of HIV infections - quantitative and qualitative perturbations.



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1986-1987

During the period of 1986, US Army contract DAMD-17-86-MM-6508 provided funding to WHMC for collection of natural history data and collaboration with extramural researchers in a San Antonio consortium for the purposes of examining concurrent non HIV viral infections as co-factors for progression of disease. This US Army contract enabled Wilford Hall to purchase \$250,000 in laboratory equipment to include: a state of the art \$180,000 cytofluorograph and cell sorter. In addition, \$130,000 in computer software was made available for creating an HIV natural history databank utilizing the Vax mainframe located at Wilford Hall. In addition, two GS-11 immunology laboratory technicians were hired for processing of T lymphocytes cell surface markers for standardized T-helper cell determination and in other specialized projects. In addition, a computer programmer and a data entry clerk were hired as well as a neuropsychiatric technician and an HIV ward secretary. All of these individuals enabled Wilford Hall to cope with an increasing patient workload and to redirect hospital resources back to patient care and away from collection of natural history data. During this first year of DoD force wide screening for HTLV III (subsequently known as HIV 1) approximately 500 active duty personnel were identified as HIV positive. Each individual received a standardized history, physical examination for presence of HIV related morbidity, lumbar puncture for analysis of CSF protein, glucose, cell count, differential, and IgG synthesis and oligoclonal bands.

#### HIV-1 Culture

In addition, resources were provided to Dr Gordon Dreesman, Ph.D., Chairman of Virology at Southwest Foundation for Biomedical Research for the culture of HIV 1 from infected USAF personnel. This was accomplished with rates of recovery ranging from 40 to 50% for Walter Reed stage 1 and 2 up to 70% for Walter Reed stage 6. In addition, cells and serum were banked at Southwest Foundation for Biomedical Research for future investigation and potential collaborations.

#### CMV

Another investigation into the role of co-factor viral infection was performed by Dr Kendall Smith, Ph.D., professor of Microbiology at the University of Texas Health Science Center in San Antonio. Dr Kendall Smith in collaboration with Dr Joan Ratner showed that the rate of seropositivity for CMV infection was on the order of 95% in HIV positive patients. This was significantly greater than for an age-matched control population. Subsequently, Dr Smith was able to identify an extremely valuable cohort of approximately 20 HIV+ patients who were CMV seronegative on initial evaluation. These individuals were followed and documented seroconversion was shown to occur in some of these patients. Preliminary insights have subsequently shown that individuals with new CMV seroconversion appear to progress at a significantly higher rate than individuals who remain seronegative at the same initial Walter Reed stage.

## Epstein Barr Virus

Similar work by Dr. Ciro Sumaya, M.D., professor of Pediatrics at the University of Texas Health Science Center in San Antonio focused on the relationship between Epstein-Barr virus infection and progression from early to late Walter Reed stage disease in HIV infection. Dr. Sumaya showed similar rates of seropositivity, on the order of 95% for HIV infected patients. In addition, he showed a statistically significantly higher percentage of patients positive for EBV antigen as well as higher titers for EBV viral capsid antibody and subsequently higher numbers of viral DNA copy per infected blood unit in patients with late Walter Reed stage disease compared to early stage disease. In summary, a significant milestone for 1986 through 1987 included the creation of an HIV unit to facilitate clinical research, the hiring of several key personnel who were essential for the continued evaluation and data gathering of HIV infected personnel; and also the creation of a sophisticated data entry collection and analysis system with links to multiple extramural collaborators. As mentioned, virological studies on HIV infection included extramural collaboration with Dr. Gordon Dreesman of Southwest Foundation for Biomedical Research and the potential role of co-factor viral infections was investigated by Dr. Sumaya for EBV and Dr. Smith for CMV.

## 1987-1988

During the year 1987 through 1988, a total of 768 HIV positive patients were entered into the WHMC databank. Of these, approximately 700 were active duty US Air Force personnel and another 60 were retirees and dependents. At this time, 64 patients met CDC criteria for the diagnosis of AIDS. Of these 768 patients, 59% were Walter Reed 1, of which half had generalized adenopathy of unknown duration; 21% were Walter Reed 2; 6% Walter Reed 3; 3% Walter Reed 4; 4% Walter Reed 5 and 7% Walter Reed 6.

1987 through 1988 was a time of intense clinical data gathering, culminating in scientific presentations at the DoD contract site visits to Wilford Hall in January 1988, the Tri-service HIV meeting in San Antonio later in January 1988, the Society of Air Force Physicians meeting in March 1988, the Tri-service ID meeting at Homestead AFB, FL in March 1988, Walter Reed Institute of Research March 1988 and a presentation by Dr Douglas Marshall (USAF retired) at the WHO working group on HIV neurological disease in Geneva, Switzerland.

A total of 13 abstracts were accepted at the V International Conference on AIDS which was held at Stockholm, Sweden in June 1988. Presentations previously reported to WRAIR and the US Army R&D Command include: correlation of sensorineural hearing loss with HIV infection, HIV viral culture data, detection of viral antigen and quantitative antibody levels in serum and CSF, interval changes in clinical status of CSF by Walter Reed stage, epidemiology and progression of HIV disease by Walter Reed stage, neuropsychiatric functioning in HIV positive patient, CSF findings in asymptomatic individuals infected by HIV, epidemiology of US Air Force force wide screening for HIV, and an investigation of attempted suicide and psychiatric diagnosis in HIV infected patients, an investigation on inhibition of lymphocyte proliferation by HIV Gp120 glycoprotein (soluble suppressor factor) and its association with disease progression, an association of remission of previously diagnosed sarcoidosis, and the utility of gallium 67 scanning in HIV patients with pulmonary disease.

### Extramural Collaborations

1987 through 1988 was a very productive year for new extramural collaborations. The most important of these was the collaboration Dr Gene Shearer, a cellular immunologist at the National Cancer Institute who in collaboration with Dr Hanna Golding and Dr Jay Berzofsky of the NCI intensively evaluated the T helper cell functional capabilities of our HIV infected individuals and with us correlated these with clinical, immunological and his orical data.

### Summary

In summary, 1987 through 1988 was a extremely active year for clinical observation and marked the beginning of intense investigation into HIV neurological disease, neuropsychiatric disease and qualitative evaluation of immunological aborations and correlations with quantitative T cell depletion.

1988-1989

During the time period of September 1988 through September 1989 a total of 878 HIV positive patients were entered into the WHMC database. During the 1989 calendar year investigation into the natural history of HIV infection continued. In addition, intensive laboratory correlation occurred in the search for surrogate markers of disease progression which would predict at an earlier stage those who are at highest risk for progression to Walter Reed stage 6 or AIDS. Among these parameters evaluated include absolute CD4A helper count, CD4 to CD8 ratio, serum IgG, IgA, IgM, IgE, presence of partial or complete anergy, presence of oral hairy leukoplakia, as well as standard chemistry profiles and hemograms. All of the above parameters correlated significantly in 1 fashion or another with presence of advanced disease at presentation but upon multivariate analysis, only low CD4A helper cell count and serum IgA were independent predictors of disease progression.

During 1989, collaboration with investigators at the National Cancer Institute including Dr Gene Shearer, Dr Berzofsky and Dr Golding included analysis of T helper cell responses to mitogens and specific soluble antigens, analysis and responsiveness to T lymphocyte IL-2 production and in vitro proliferation in response to synthetic HIV peptides generated by Dr Berzofsky. In addition, Dr Golding analyzed antibodies which cross react with HLA DR and HIV 1 gp41 which was present in statistically significantly higher levels in individuals at later Walter Reed stage disease than those with early stage disease supporting the hypothesis that there may be an autoimmune reaction between HLA DR and HIV gp41 leading to progressive T cell depletion and functional impairment of T lymphocyte responses and progressive immunodeficiency.

#### Neurological Natural History

The HIV neurological natural history investigation reached its peak of productivity during calendar year 1989. All patients received a complete neurological evaluation, a lumbar puncture and CSF analysis with the parameters previously described. In selected cases, myelin basic protein, HIV culture and p24 antigen detection was performed on CSF. Among the neurological findings of note, we found a low prevalence of CNS opportunistic infection as presenting symptom of AIDS. In addition, HIV or AIDS related dementia did not occur in early stage patients. In a study of neurologically asymptomatic HIV 1 infected Air Force personnel with at least two CSF studies, and a minimum of 270 days between analysis it was found that there were significant increases over time in nucleated cell counts, measures of interthecal IgG production and decrease in protein levels. When CD4A counts dropped below 400 per cubic millimeter, cellular responses and immunological changes were less impressive. These findings suggest that CSF immune response is maximal when patients are immunocompetent and more blunted as they become T cell depleted. Neuropsychiatric testing showed absence of dementia at early stages although there was the appearance of considerable test related anxiety for individuals with a first time diagnosis of HIV infection.

Two other neurologically related studies were accomplished including assaying for the presence of anticardiolipin and IgG antibodies in the CSF which showed that in patients with serum anticardiolipin antibodies there was no statistically significant difference between patients and controls for CSF anticardiolipin antibody IgM but 9 of 12 had abnormal CSF anticardiolipin IgG levels.

A study of neurological nerve conduction velocities on nearly 300 HIV infected patients showed a statistically significantly slower rate of conduction with T cell counts of less than 200/cubic millimeter.

## Oral Hairy Leukoplakia

During this year, a controlled cohort of patients with oral hairy leukoplakia was identified of which 72 were confirmed by biopsy. The overall prevalence of biopsy confirmed OHL in the entire cohort is approximately 9%.

Interestingly, whites were disproportionately represented in the OHL+ group, even after controlling for possible selection bias, based on clinical OHL cases who refused tongue biopsy. An OHL+ cohort was compared to an OHL- cohort of 495 HIV+ patients. Patients who had OHL pathologically diagnosed with three times more likely to subsequently develop more severe clinical findings, either by advancing beyond Walter Reed stage 3 with an odds ratio of 2.9 at p value of less than .001 or beyond Walter Reed stage 4 with an odds ratio of 3.5 with a p value of less than .001. Similarly, they were also 3.3 times more likely to drop below 200 absolute CD4a cells per cubic millimeter, with an odds ratio of 3.3 and a p value of less than 0.001. Progression to CD4 of less than 200 or beyond Walter Reed stage 3 persisted even when controlling for initial CD4a, race or age. P was less than 0.01. Although OHL+ patients had the same mean age, they had an initial CD4a count of 550 CD4 cells per cubic millimeter which was significantly different from the mean of 650 in the OHL- group. Again, despite changes in initial CD4a level when these were controlled for, there was significantly more rapid fall in helper cell in the OHL+ than in OHL- group.

## Rapid Progressors

We have identified a cohort of 26 rapid progressors and matched them with a control population of 26 patients who did not progress for: CD4 initial T-cell count, race, age and sex. Laboratory markers which distinguished progressors from non-progressors included serum LDH, which was higher in progressors at initial admission,  $p < 0.02$ , serum IgA concentration,  $p < 0.001$ , initial IgE values, hemoglobin and platelet count. Syphilis and hepatitis B serologies were not predictive of progression. The change in serum IgE during the interval trended toward significance at  $p < 0.06$ . In addition, very recently we have begun performing in-house assays for serum neopterin, TNF/cachetin and beta-2 microglobulin which in other cohort studies have been independent predictors of disease progression.

Although numbers were small, it appears that this partially confirms the observations of Greenspan et al (JID 1987, 155, pg 475) who report OHL as a significant bad prognostic marker for progression to AIDS over a 30 month period.

## Summary

Milestones for 1988-1989 included: extension and consolidation of observations obtained in 1987 and 1988 on the natural history of HIV-1 infection, role of oral hairy leukoplakia, rates of progression of their natural history study patients, further followup on patients with HIV neurological evaluation and additional studies on subgroups of rapid versus slow progressors in the overall HIV+ patient population.

Because funding for 1988 through 1989 was piecemeal, the major efforts during this time period were directed at insuring continued evaluation of existing projects.

The cumulative number of HIV+ patients in the databank reached 989. Over the last 6 months, we have performed 236 evaluations including 59 new patients and 177 re-evaluations.



Demographic characteristics in our cohort have tended to follow the same patterns as previously established with approximately with 50% caucasians, 40% blacks and 10% other racial and ethnic groups.

Close interactions among multidisciplinary groups in comparing natural history data, CD4 cell counts, neuropsychiatric testing, neurological findings, pediatric HIV infections, spouse studies and many other US Army RV protocols were reviewed, accepted and principal investigators designated at Wilford Hall USAF Medical Center.

1989 was largely a year of transition for the HIV project at WHMC as US Army funding mechanisms changed but monies were made available to ensure continuity of the project until such time as the Henry M. Jackson Foundation memorandum of understanding was completed between the US Air Force, US Army and all other principals.

## PUBLICATIONS

1. Sumaya C, Boswell R, Ench Y, Kisner D, Hersch E: Enhanced Serological and Virological Findings of Epstein-Barr Virus in Patients with AIDS and AIDS-Related Complex. *Journal of Infectious Diseases* 154:864-870, 1986.
2. Kennedy C, Dreesman G, Chanh T, Boswell R, Allan J, Lee T, Essex M, Sparrow J, J, Ho D, Kanda P, Use of a Resin-bound Synthetic Peptide for Identifying a Neutralizing Antigenic Determinant Associated with the Human Immunodeficiency Virus Envelope. *J of Biological Chemistry* Vol 262: 57-69, 1987.
3. Alsip G, Ench Y, Sumaya C, Boswell R. Increased Epstein-Barr virus DNA in Oropharyngeal Secretions from Patients with AIDS, AIDS-related Complex or Asymptomatic Human Immunodeficiency Virus Infection. *J of Infectious Diseases*, Vol 157: 1072-1076, 1988.
4. Fling J, Fischer J, Boswell R, Reid M. The Relationship of Serum IgA Concentration to HIV Infection: A Cross-Sectional Study of HIV Seropositive Individuals Detected by Screening in the USAF. *J of Allergy & Clinical Immunology*, 82:965-970, 1988.
5. Appleman M, Marshall D, Brey R, Houk R, Beatty D, Winn R, Melcher G, Wise M, Sumaya C, Boswell R. Cerebrospinal Fluid Abnormalities in Patients Without AIDS Who Are Seropositive for the Human Immunodeficiency Virus Infections. *J of Infectious Diseases*, Vol 158, 193-199, 1988.
6. Rundell J, Beatty D, Paolucci S, Boswell R. Psychiatric Illness at all Stages of Human Immunodeficiency Virus Infection. *American J of Psychiatry*, Vol 145, 652-653, 1988.
7. Reid M, Goetz D, Zajac R, Houk R, Boswell R. Natural History of Human Immunodeficiency Virus Infection in Screened HIV Positive USAF Personnel: A Preliminary report. *J of Acquired Immunodeficiency Disease* 1:508-515, 1988.
8. Alsip G, Ench Y, Sumaya C, Boswell R. Increased Epstein-Barr Virus DNA in Oropharyngeal Secretions of Patients with AIDS, AIDS-Related Complex or Asymptomatic Human Immunodeficiency Virus Infections, Epstein Barr Virus and Human Disease. PH Levine, DV Ablashi, M Monoyama, GR Pearson, R Glaser (eds), the Humana Press Inc. Clifton, New Jersey 119-120.
9. Boswell R. AIDS 1988. *Journal of the Arkansas Medical Society*, Vol 85, Pg 73-85, 1988.
10. Marshall D, Brey R, Cahill W, Houk R, Zajac R, Boswell R. Spectrum of Cerebrospinal Fluid Findings in Various Stages of Human Immunodeficiency Virus Infection. *Arch Neurol*, Vol 45, 954-958, 1988.
11. Thomason J, Rundell J, Boswell R. Suicide Attempts Among Human, Immunodeficiency Seropositive Individuals in a Mandatory Screening Program. *Psychosomatics*, in press.
12. Praus D, Thomason J, Rundell J, Marshall D, Boswell R, Zajac R, Butzin C. Lack of Association between CSF Findings and Request for Psychiatric Evaluation in HIV Infected Patients. *General Hospital Psychiatry*, In Press.
13. Clerici M, Stocks N, Zajac R, Boswell R, Via C, Shearer G. Circumvention of Defective CD4 T Helper Cell Function in HIV Infected Individuals by Stimulation with HLA Alloantigens. *Journal of Immunology*, Vol 144, 3266-3271, 1990.

14. Rundell J, Brown G, Pace J, Drexler K, McManis S, Kyle S, Paolucci S, Boswell N. Persistence of Psychiatric Findings in HIV-Seropositive Persons. Submitted for Publication.
15. Berger R, Hobbs E, Stone M, Hayes T, Boswell R. Manifestations of Early Human Immunodeficiency Exposure. J American Academy of Derm; 19:298-303, 1988.
16. Goethe K, Mitchell J, Marshall D, Brey R, Cahill W, Leger G, Hoy L, Boswell R. Neuropsychological and Neurological Function of Human Deficiency Virus Seropositive Asymptomatic Individuals. Arch of Neurol, Vol 46:129-133, 1989.
17. Brey R, Houk R, Patel P, Boswell R, et al. Anticardiolipin Antibody and HIV Infection. Clinical Exp Rheum 88, 6:199, 1988.
18. Arroyo R, Brey R, Higgs J, Boswell R. Anticardiolipin Antibody in Patients with HIV Infection. Submitted for Publication.
19. Ridley D, Houk R, Reid M, Boswell R. Early Lymphocyte Transformation Abnormalities in Human Immunodeficiency Virus Infection. J Clin Immunology Vol 9:2, 119, 124, 1989.
20. Clerici M, Stocks N, Zajac R, Boswell R, Bernstein D, Mann D, Shearer G, Berzofsky J. IL-2 Production Permits Detection of Antigenic Peptide Recognition by T Helper Lymphocytes from Asymptomatic HIV Seropositive Individuals. Nature, Vol 339, 383-385, 1989.
21. Lucey D, Zajac R, Melcher G, Butzin C, Boswell R. Comparison of IgE levels and CD+4 T Cell Counts in 662 HIV Positive USAF personnel. AIDS Research and Human Retroviruses, Vol 6, 427-429, 1990.
22. Golding H, Shearer G, Hillman K, Lucas P, Manischewitz J, Zajac R, Clerici M, Gress R, Boswell R, Golding B. Common Epitope in HIV-1, GP41 and HLA Class I Elicits Immunosuppressive Autoantibodies Capable of Contributing to Immune Dysfunction in HIV-1 Infected Individuals. J Clin Invest, 83: 1430-1435, 1989.
23. La Rosa G, Matthews T, Javaherian K, Profy A, Shadduck P, Emini E, Boswell R, Weinhold K, Bolognesi D, Putney S. Variation of the Principal Neutralizing Determinant of HIV-1. In press, Vaccines 90, Cold Spring Harbor Laboratory.
24. Clerici M, Lucey D, Zajac R, Boswell R, Gebel H, Takahashi H, Berzofsky J, Shearer G. Detection of Cytotoxic T Lymphocytes Specific for Synthetic Peptides of Gp 160 in Hiv-Seropositive Individuals. Submitted for Publication.
25. Fuchs D, Shearer G, Boswell R, Clerici M, Reibnegger G, Zajac R. Activated Cell-Mediated Immunity and Reduced Proliferative Response of T-Cells in Vitro in Patients with HIV-1 Infection. Accepted for Publication.
26. Warren R, Wolf H, Shuler K, Eichberg J, Zajac R. Boswell R. Kanda P, Kennedy R. Synthetic Peptides Define the Fine Specificity of HIV gp160 Humoral Immune Response in HIV-1 Infected Chimpanzees. Journal of Virology 64: 486-492, 1990.
27. Putney S, LaRosa G, Matthews T, Emini E, Boswell R, Bolognesi D, Weinhold K. The Principal Neutralizing Determinant of HIV-1. Proceedings of the HIV Annual Cent Gardes Meeting, Paris, France, 1989.
28. Clerici M, Stocks N, Zajac R, Boswell R, Lucey D, Via C, Shearer G. Detection

of Three Distinct Patterns of T Helper Cell Dysfunction in Asymptomatic, HIV Seropositive Patients: Independence of CD4+ Cell Numbers and Clinical Staging. *Journal of Clinical Investigation*, Vol 84, 1892-1899, 1989.

29. Fuchs D, Shearer G, Boswell R, Clerici M, Reibnegger G, Werner E, Zajac R, Wachter H. Increased Serum Neopterin in Patients with HIV-1 Infection Correlates to Reduced in Vitro IL-2 Production. *Clin Exp Immunol*, 80, 44-48, 1990.
30. Brey R, Arroyo R, Boswell R. Cerebrospinal Fluid Anticardiolipin Antibodies in HIV-1 Infected Patients. Submitted for Publication.
31. Clerici M, Landay A, Kessler H, Zajac R, Boswell R, Muluk S, Shearer G. Multiple Patterns of Alloantigen Presenting/Stimulating Cell Dysfunction in Patients with Acquired Immune Deficiency Syndrome (AIDS). Submitted for Publication.
32. Clerici M, Stocks N, Zajac R, Boswell R, Shearer G. Accessory Cell Function in Asymptomatic Human Immunodeficiency Virus-Infected Patients. *Clinical Immunology and Immunopathology*, Vol 54:168-173, 1990.
33. Fuchs D, Shearer G, Boswell R, Lucey D, Clerici M, Reibnegger G, Warner E, Zajac R, Wachter H. Negative Correlation Between Blood Cell Counts and Serum Neopteric Concentration in Patients with Human Immunodeficiency Virus Type 1 Infection. Submitted for Publication.
34. Lucey D, Hendrix C, Andrzejewski C, McGlasson D, Ward W, Melcher G, Zajac R, Boswell N. Hepatitis C Antibody in a Non-Hemophiliac Cohort Infected with the Human Immunodeficiency Virus. Submitted for Publication.
35. Lucey R, Hensley R, Butzin C, Boswell R. Early Upregulation and Late Decline in CD<sub>4</sub> Monocytes with HIV Infection. Presented at the 32nd Annual Air Force Regional Meeting of the American College of Physicians, San Antonio, Texas, March 1990. Submitted for Publication.

#### ABSTRACTS AND PRESENTATIONS

1. Zajac R, Boswell R. Acquired Immune Deficiency Syndrome and Kaposi's Sarcoma Presenting as Retinitis with Nephrotic Syndrome. Presented 25th Annual AF Regional Meeting of the American College of Physicians, San Antonio, Texas, March 1983.
2. Hayes T, Boswell R. Acquired Immune Deficiency Syndrome. Presented at Congreso Mundial De Dermatologia Tropical, Mexico City, Mexico, October 1984.
3. Block S and Boswell R. Impaired "In-Vitro" Lymphocyte Transformation in the AIDS Related Complex (ARC): Detection only at Suboptimal Concentrations of Mitogens. Presented at the 27th Annual Air Force Regional Meeting of American College of Physicians, Dayton, Ohio, March 1985 (Grollman Award for Outstanding Resident Paper, Society of Air Force Physicians).
4. Zajac R and Boswell R. AIDS at WHMC-An Update. Presented 27th Annual Air Force Regional Meeting of American College of Physicians, Dayton, Ohio, March 1985.
5. Sumaya C, Yasmin E, Boswell R, Moore C, and Kisner D. Epstein-Barr Virus Infections in Acquired Immunodeficiency Syndrome. Presented at 1st International Conference on Acquired Immunodeficiency Syndrome, Atlanta, Georgia, April 1985.
6. Moore C, McCombs J, Sumaya C, Kisner D, and Boswell R. Chromosome Aberrations in PHA-Stimulated Lymphocytes of Patients with AIDS or AIDS Related Complex.

7. Presented at 1st International Conference on Acquired Immunodeficiency Syndrome, Atlanta, April 1985.
8. Nolan C, Boswell R. Nephrotic Syndrome Glomerulopathy in Acquired Immunodeficiency Syndrome. Presented at the 27th Annual Air Force Regional Meeting of the American College of Physicians, Dayton, Ohio, March 1985.
9. Zajac R, Boswell R, Winn R: AIDS 1985-1986: The USAF Experience at Wilford Hall USAF Medical Center. Presented at the 28th Annual AF Regional Meeting of American College of Physicians, San Antonio, Texas, February 1986.
10. Winn R, Zajac R, and Boswell R. Preliminary Results of Air Force Testing Programs for HTLV III (Lackland AFB): Pandora - Where Are You? Presented at the 28th Annual Air Force Regional Meeting of the American College of Physicians, San Antonio, Texas, February 1986.
11. Winn R, Zajac R, and Boswell R: Preliminary Results of Air Force Testing Programs for HTLV III (Lackland AFB): A Program in Evolution, Presented at the 11th Annual Meeting of Society of Armed Forces Medical Laboratory Scientists, San Antonio, Texas, March 1986.
12. Sumaya C, Boswell R, Ench Y, Kisner D, Hersh E, Moore C, et al. Enhanced Epstein-Barr Virus infections in Patients with Acquired Immunodeficiency Syndrome (AIDS) and AIDS-Related Complex (ARC), Presented at 2nd International Conference on Acquired Immunodeficiency Syndrome (AIDS), Paris, France,
13. Moore C, McCombs J, Sumaya C, Boswell R. Chromosomal Aberrations in PHA-Stimulated Lymphocytes of Patients with AIDS or AIDS-Related Complex, Presented at 2nd International Conf on Acquired Immunodeficiency Syndrome (AIDS), Paris, France, June 1986.
14. Winn R, Zajac R, Melcher G, Boswell R. Screening for HTLV III Antibody in USAF Recruits, Presented at Interscience Conference on Anti-microbial Agents and Chemotherapy, September 1986.
15. Winn R, Zajac R, Melcher G, Appleman M, Boswell R. Demographic Analysis of HIV Positive Recruits Through an Air Force Screening Program-An Update. Presented at the 29th Annual Air Force Regional Meeting of the American College of Physicians New Orleans, Louisiana, March 1987.
16. Ridley D, Houk R, Boswell R. Lymphocyte Stimulation in Human Immunodeficiency Virus Infection. Presented at the 29th Annual Air Force Regional Meeting of the American College of Physicians, New Orleans, Louisiana, March 1987.
17. Appleman M, Brey R, Marshall D, Boswell R, Houk R, Winn R. Cerebrospinal Fluid Findings in HIV Positive Patients Without AIDS. Presented at 3rd Int Conf on Acquired Immunodeficiency Syndrome (AIDS), Washington DC, July 1987.
18. Eichberg J, Dreesman G, Boswell R, Alter H, Levy J, Berman P. Positive Cellular Immune Responses in Humans and Chimpanzees Infected with the Human Immunodeficiency Virus. Presented at 3rd Intl Conf on Acquired Immunodeficiency Syndrome, Washington, DC, June 1987.
19. Brey R, Houk R, Duginski T, Patel P, Boswell R. Anticardiolipin Antibody and HIV Infection. Presented at 3rd Conference on Antiphospholipid Antibodies, Kingston, Jamaica, January 1988.

20. Appleman M, Marshall D, Brey R, Houk R, Beatty D, Winn R, Boswell R. Cerebrospinal Fluid Abnormalities in Patients Seropositive to the Human Immunodeficiency Virus Without the Acquired Immunodeficiency Syndrome. Presented at 30th Annual Air Force Regional Meeting of the American College of Physicians, San Antonio, Texas, March 1988.
21. Wolfe P, Harden E, Sumaya C, Boswell R. An EBV Associated Lymphoid Malignancy in a Patient with AIDS: Case Report and Quantitation of EBV DNA in Patients B Cells. Presented at 30th Annual Air Force Regional Meeting of the American College of Physicians, San Antonio, Texas, March 1988.
22. Jaso R, Zajac R, Beck D, Fowler C, Reed K, Winn R, Boswell R. Human Papilloma VIRUS (HPV) in HIV Positive Individuals: Condylomata, Oral Hairy Leukoplakia and Cervical Dysplasia. Presented at 30th Annual Air Force Regional Meeting of the American College of Physicians, San Antonio, Texas, March 1988.
23. Hartle J, Vaughn M, Boswell R, Houk R. Human Immunodeficiency Virus Antibody Positive Sera Suppression of Mitogen Driven Lymphocyte Proliferation. Presented at 30th Annual Air Force Regional Meeting of the American College of Physicians, San Antonio, Texas, March 1988.
24. Reid M, Goetz D, Zajac R, Boswell R. The Natural History of Human Immunodeficiency Virus Infection in Screened HIV Positive USAF Personnel: A Preliminary Report. Presented at 30th Annual Air Force Regional Meeting of the American College of Physicians, San Antonio, Texas, March 1988.
25. Zajac R, Winn R, Melcher G, Boswell R, Friedstrom S, Piper J, Carr R, Mumm A, Wiesenfeld R. HIV Disease in USAF Active Duty and Dependent Personnel. Presented at 30th Annual Air Force Regional Meeting of the American College of Physicians, San Antonio, Texas, March 1988.
26. Vaughn M, Houk R, Boswell R. Identification of an Immunosuppressive Factor in HIV Infected Sera. Presented at 30th Annual Air Force Regional Meeting of the American College of Physicians, San Antonio, Texas, March 1988 (Grollman Award for the Outstanding Resident Paper, Society of Air Force Physicians).
27. Marshall D, Brey R, Cahill W, Houk R, Boswell R. Immunologic Abnormalities of Cerebrospinal Fluid in Asymptomatic Human Immunodeficiency Virus Infected Individuals. Neurology Supp 38:3, 167, 1988.
28. Vaughn M, Hartle J, Houk R, Boswell R, Reid M. Identification of an Immunosuppressive Factor in HIV Infected Sera. Presented at the 44th Annual Meeting American Academy of Allergy and Immunology, Anaheim, March 1988.
29. Clerici M, Stocks N, Zajac R, Boswell R, Via C, Shearer G. Selective Defect in CD4+ but not CD8+ T helper cell Function in Asymptomatic HIV Seropositive Individuals. Presented at 9th European Immunology Conference, Rome, Italy, September 1988.
30. Bell A, Atkins J, Zajac R, Boswell R. HIV and Sensorineural Hearing Loss. Presented at the 4th International Conference on AIDS, Stockholm, Sweden, June 1988.
31. Marshall D, Brey R, Cahill W, Zajac R, Houk R, Boswell R. CSF Findings in Asymptomatic Individuals Infected by HIV. Presented at the 4th International Conference on AIDS, Stockholm, Sweden, June 1988.

32. Vaughn M, Chanh T, Dreesman G, Hartle E, Houk R, Boswell R. Inhibition of Lymphocyte Proliferation by HIV Coat Protein and its Association with Disease Progression. Presented at the 4th International Conference on AIDS, Stockholm, Sweden, June 1988.
33. Carr R, Mumm A, Zajac R, Marshall D, Wolfe W, Reid M, Boswell R. Epidemiology Progression of HIV Disease by Walter Reed Stage in the USAF. Presented at the 4th International Conference on AIDS, Stockholm, Sweden, June 1988.
34. Zajac R, Abbadessa S, Jaso R, Houk R, Reid M, Melcher G, Winn R, Dreesman G, Mumm A, Carr R, Boswell R. U.S. Air Force HIV Natural History Study. Presented at the 4th International Conference on AIDS, Stockholm, Sweden, June 1988.
35. Mumm A, Carr R, Zajac R, Melcher G, Winn R, Boswell R. Epidemiology of U.S. Air Force-Wide Screening for HIV Seropositivity. Presented at the 4th International Conference on AIDS, Stockholm, Sweden, June 1988.
36. Brey R, Marshall D, Cahill W, Zajac R, Houk R, Boswell R. Interval Change in Clinical and CSF Parameters in HIV+ Patients. Presented at the 4th International Conference on AIDS, Stockholm, Sweden, June 1988.
37. Zefo N, Weiland F, Zajac R, Abbadessa S, Boswell R. Utility of Gallium- 7 Scanning in HIV+ Patients with Pulmonary Disease. Presented at the 4th International Conference on AIDS, Stockholm, Sweden, June 1988.
38. Zajac R, Houk R, Zefo N, Weiland F, Jaso R, Abbadessa S, Fowler C, Sykes R, Boswell R. Sarcoidosis and HIV Infection. Presented at the 4th International Conference on AIDS, Stockholm, Sweden, June 1988.
39. Rundell J, Thomason J, Zajac R, Beatty D, Boswell R. Psychiatric Diagnosis and Attempted Suicide in HIV Infected USAF Personnel. Presented at the 4th International Conference on AIDS, Stockholm, Sweden, June 1988.
40. Sumaya C, Ench Y, Boswell R. Epstein-Barr Virus Antibodies Correlated with Advancing HIV Infections. Presented at the 4th International Conference on AIDS, Stockholm, Sweden, June 1988.
41. Way D, Davis H, Brown M, Boswell N. Detection of HIV Antigen; Analysis of HIV Antibody Positive Serum and Cerebral Spinal Fluid Paired Specimens Using Two Enzyme-linked Immunosorbent Assay (ELISA) Systems. Presented at the 13th Annual Meeting of the Society of Armed Forces Medical Laboratory Scientists, Reno, Nevada, March 1988.
42. Boswell R, Zajac R, Dreesman G, Houk R, Paul D, Dawson G, Marshall D, Brey R. HIV Viral Culture, Detection of Viral Antigen and Quantitative Antibody Levels in Serum and CSF. Presented at the 4th International Conference on AIDS, Stockholm, Sweden, June 1988.
43. Reid M, Goetz D, Zajac R, Boswell R. The Natural History of Human Immunodeficiency Virus Infection in Screened HIV Positive USAF Personnel: A Preliminary Report. Presented at the 4th International Conference on AIDS, Stockholm, Sweden, June 1988.
44. Mitchell J, Marshall D, Leger D, Boswell R. Longitudinal Neuropsychological Evaluations on a Cohort of HIV-Infected USAF Personnel. Presented at the 31st Annual Air Force Regional Meeting of the American College of Physicians

Bethesda, Maryland, Mar 89.

45. Gronseth G, Marshall D, Brey R, Lucey D, Boswell R. Aids Dementia Complex (ADC) in the Population Based USAF HIV Study. Presented at the 31st Annual Air Force Regional Meeting of the American College of Physicians, Bethesda, Mar 89.
46. Marshall D, Lucey D, Zajac R, Brey R, Boswell N. Prevalence of CNS Opportunistic Infection (OI) in USAF Epidemiologic Study of HIV Infection. Presented at the 31st Annual Air Force Regional Meeting of the American College of Physicians, Bethesda, Maryland, Mar 89.
47. Freeman T, Hensley R, Butzin C, Boswell N. Activated T-cells and Human Immunodeficiency Virus (HIV) Progression. Presented at the 31st Annual Air Force Regional Meeting of the American College of Physicians, Bethesda, Maryland, 1989.
48. Zajac R, Lucey D, Melcher G, Mumm A, Gibson R, Marshall D, Boswell R. HIV in the USAF-1989. Presented at the 31st Annual Air Force Regional Meeting of the American College of Physicians, Bethesda, Maryland, Mar 89.
49. Benton J, Ward W, Boswell R, Zajac R. Evaluation of HIV Core Antigen Tests. Presented at the 14th Annual Meeting of the Society of Armed Forces Medical Laboratory Scientists. San Antonio, Texas, March 89.
50. Freeman T, Hensley R, Butzin C, Boswell R. Activation of T-cells and HIV Progression. Presented at 31st Annual Air Force Regional Meeting of the American College of Physicians, Bethesda, Maryland, March 1989.
51. Brey R, Arroyo R, Marshall D, Boswell R. Anticardiolipin Antibodies in the Cerebrospinal Fluid of HIV Infected Patients. Presented at the American Academy of Neurology Annual Meeting, Cincinnati, Ohio, April 1989.
52. Marshall D, Lucey D, Zajac R, Brey R, Boswell R. Prevalence of CNS opportunistic Infection (OI) in the USAF Epidemiologic Study of HIV Infection. Presented at the American Academy of Neurology Annual Meeting, Cincinnati, Ohio, April 1989.
53. Marshall D, Brey R, Butzin C, Zajac R, Boswell R. Longitudinal CSF Findings in 240 HIV-Infected USAF Personnel. Presented at the American Academy of Neurology Annual Meeting, Cincinnati, Ohio, April 1989.
54. Marshall D, Brey R, Butzin C, Zajac C, Boswell R. Formulas for Intrathecal Production of IgG in the Setting of HIV Infection. Presented at the American Academy of Neurology Annual Meeting, Cincinnati, Ohio, April 1989.
55. Marshall D, Butzin C, Brey R, Boswell R. Integrity of the Blood-Brain-Barrier (BBB) During the Course of HIV-1 Infection. Presented at the American Academy of Neurology Annual Meeting, Cincinnati, Ohio, April 1989.
56. Marshall D, Gronseth G, Brey B, Lucey D, Boswell R. AIDS Dementia Complex (ADC) in the Population Based USAF HIV Study. Presented at the American Academy of Neurology Annual Meeting, Cincinnati, Ohio, April 1989.
57. Mitchell J, Marshall D, LeForce B, Leger D, Boswell R. Accuracy of the Mini Mental State Examination (MMSE) for Screening of Neuropsychological Impairment in Human Immunodeficiency Virus (HIV) - Infected Patients. Presented at the American Academy of Neurology Annual Meeting, Cincinnati, Ohio, April 1989.



58. Mitchell J, Marshall D, Goethe E, Leger D, Boswell R. Human Immunodeficiency Virus (HIV): Immune System Compromised and Neuropsychological Functioning. Presented at the American Academy of Neurology Annual Meeting, Cincinnati, Ohio, April 1989.
59. Mitchell J, Marshall D, Leger D, Boswell R. Longitudinal Neuropsychological Evaluations on a Cohort of HIV Infected USAF Personnel. Presented at the American Academy of Neurology Annual Meeting, Cincinnati, Ohio, April 1989 and V Int Conference on AIDS, Montreal, Canada, June, 1989.
60. Arroyo R, Brey R, Higgs J, Boswell R, Harris N. Anticardiolipin Antibody in Patients with HIV Infection. Presented at the V Int Conference on AIDS, Montreal Canada, June 1989.
61. Andrzejewski C, Benton J, Valtier S, Lucey D, Boswell N. Autoreactivity in Patients Infected with HIV. Presented at the V Int Conference on AIDS, Montreal, Canada, 1989.
62. Lucey D, Zajac R, Melcher G, Butzin C, Boswell R. Serum IgE levels vary with Absolute CD4A Lymphocyte Counts in HIV Positive Persons. Presented at the V International Conference on AIDS, Montreal, Canada, June 1989.
63. Lucey D, Zajac R, Melcher G, Butzin C, Boswell R. Comparison of IgE Levels and CD4 T-Cell Counts in 22 HIV-Positive US Air Force Personnel. Presented at 29th ICAAC, Houston, Texas, October 1989.
64. Lucey D, Melcher G, Zajac R, Butzin A, Boswell R. Markers of Disease Progression in the USAF HIV Natural History Study. Presented at 29th ICAAC, Houston, Texas, October 1989.
65. Lucey D, Hensley R, Butzin C, Boswell R. Selection Depletion of CD4+ Monocytes During HIV Disease. Presented at 29th ICAAC, Houston, Texas, October 1989.
66. Shearer G, Clerici M, Stocks N, Zajac R, Boswell R, Via C. Bypass of Defective CD4 T-Helper Cell Function in HIV+ Individuals by Stimulation with Alloantigens. Presented at FASEB, Washington, DC, May 1989.
67. Clerici M, Shearer G, Stocks N, Zajac R, Boswell R, Via C. Defective T-Helper Pathways in Asymptomatic HIV+ Individuals. Presented at FASEB, Washington, DC, May 1989.
68. Clerici M, Stocks N, Zajac R, Boswell R, Shearer G, Berzofsky J. T-Helper Cell Response to Synthetic HIV Peptide Antigens in Asymptomatic HIV Seropositive Individuals. Presented at FASEB, Washington, DC, May 1989.
69. Lucey D, Zajac R, Melcher G, Butzin C, Boswell R. Serum IgE Levels Vary with Absolute CD4A Lymphocyte Counts in HIV Positive Persons. Presented at the V International Conference on AIDS, Montreal, Canada, June 1989.
70. Brey R, Arroyo R, Marshall D, Boswell R. Intrathecal Production of Anticardiolipin Antibodies in HIV-1 Infection. Presented at the V Int Conference on AIDS Montreal, Canada, June 1989.
71. Clerici M, Stocks N, Zajac R, Boswell R, Via C, Shearer G. Circumvention of Defective CD4 T-Helper Cell Function in HIV+ Individuals by Stimulation with HLA Alloantigens. Presented at FASEB 1989.

72. Mitchell J, Marshall D, Goethe E, Leger D, Boswell R. Human Immunodeficiency Virus (HIV): Immune System Compromised and Neuropsychological Functioning. Presented at the American Academy of Neurology Annual Meeting, Cincinnati, Ohio, April 1989.
73. Mitchell J, Marshall D, Leger D, Boswell R. Longitudinal Neuropsychological Evaluations on a Cohort of HIV Infected USAF Personnel. Presented at the American Academy of Neurology Annual Meeting, Cincinnati, Ohio, April 1989 and V Int Conference on AIDS, Montreal, Canada, June, 1989.
74. Arroyo R, Brey R, Higgs J, Boswell R, Harris N. Anticardiolipin Antibody in Patients with HIV Infection. Presented at the V Int Conference on AIDS, Montreal Canada, June 1989.
75. Andrzejewski C, Benton J, Valtier S, Lucey D, Boswell N. Autoreactivity in Patients Infected with HIV. Presented at the V Int Conference on AIDS, Montreal, Canada, 1989.
76. Lucey D, Zajac R, Melcher G, Butzin C, Boswell R. Serum IgE levels vary with Absolute CD4+ Lymphocyte Counts in HIV Positive Persons. Presented at the V International Conference on AIDS, Montreal, Canada, June 1989.
77. Lucey D, Zajac R, Melcher G, Butzin C, Boswell R. Comparison of IgE Levels and CD4+ T-Cell Counts in 22 HIV-Positive US Air Force Personnel. Presented at 29th ICAAC, Houston, Texas, October 1989.
78. Lucey D, Melcher G, Zajac R, Butzin A, Boswell R. Markers of Disease Progression in the USAF HIV Natural History Study. Presented at 29th ICAAC, Houston, Texas, October 1989.
79. Lucey D, Hensley R, Butzin C, Boswell R. Selection Depletion of CD4+ Monocytes During HIV Disease. Presented at 29th ICAAC, Houston, Texas, October 1989.
80. Shearer G, Clerici M, Stocks N, Zajac R, Boswell R, Via C. Bypass of Defective CD4 T-Helper Cell Function in HIV+ Individuals by Stimulation with Alloantigens. Presented at FASEB, Washington, DC, May 1989.
81. Clerici M, Shearer G, Stocks N, Zajac R, Boswell R, Via C. Defective T-Helper Pathways in Asymptomatic HIV+ Individuals. Presented at FASEB, Washington, DC, May 1989.
82. Clerici M, Stocks N, Zajac R, Boswell R, Shearer G, Berzofsky J. T-Helper Cell Response to Synthetic HIV Peptide Antigens in Asymptomatic HIV Seropositive Individuals. Presented at FASEB, Washington, DC, May 1989.
83. Lucey D, Zajac R, Melcher G, Butzin C, Boswell R. Serum IgE Levels Vary with Absolute CD4+ Lymphocyte Counts in HIV Positive Persons. Presented at the V International Conference on AIDS, Montreal, Canada, June 1989.
84. Brey R, Arroyo R, Marshall D, Boswell R. Intrathecal Production of Anticardiolipin Antibodies in HIV-1 Infection. Presented at the V Int Conference on AIDS Montreal, Canada, June 1989.
85. Clerici M, Stocks N, Zajac R, Boswell R, Via C, Shearer G. Circumvention of Defective CD4 T-Helper Cell Function in HIV+ Individuals by Stimulation with HLA Alloantigens. Presented at FASEB 1989.

86. Lucey R, Melcher G, Zajac R, Benton J, Butzin C, Boswell R. Predictors of HIV Disease Progression in Personnel with Three WHMC Evaluations. Presented at the 32nd Annual Air Force Regional Meeting of the American College of Physicians, San Antonio, Texas, March 1990.
87. Spencer G, Melcher G, Zajac R, Boswell R. T4 lymphocyte count and AIDS-Defining Opportunistic Infections. Presented at the 32nd Annual Air Force Regional Meeting of the American College of Physicians, San Antonio, Texas, March 1990.
88. Zajac R, Lucey D, Melcher G, Jaso R, Abbadessa S, Fowler C, Hall K, Boswell R. Oral hairy leukoplakia (OHL) in the USAF HIV Natural History Cohort. Presented at the 32nd Annual Air Force Regional Meeting of the American College of Physicians, San Antonio, Texas, March 1990.
89. Zajac R, Lucey D, Jaso R, Melcher G, Abbadessa S, Fowler C, Reed K, Sumaya C, Butzin C, Hall K, Boswell R. Oral Hairy Leukoplakia (OHL) in the USAF HIV Natural History Study Cohort. Presented at 29th ICAAC, Houston, Texas, October 1989.
90. Rundell J, Wise M, Brown G, Holloway H, Boswell R, Weiss T. Relative Frequency of HIV Disease as a Cause of Mood Disorders in a General Hospital. Presented at the Neuropsych Conference VI International Conference on AIDS, Monterey, California, June 1990.
91. Rundell J, Praus D, Thomason J, Brown G, Marshall D, Holloway H, Boswell R. CSF Findings and Request for Psychiatric Examinations in HIV-Infected Patients. Presented at the Neuropsych Conference VI International Conference on AIDS, Monterey, California, June 1990.
92. Rundell J, Praus D, Brown G, Marshall D, Boswell R, Holloway H. CSF Parameters, Immune Status, Serum Viral Titers, Anxiety, and Depression in HIV Disease. Presented at the Neuropsych Conference VI International Conference on AIDS, Monterey, California, June 1990.
93. Lucey D, Hendrix C, Andrzejewski C, Melcher G, Zajac R, Boswell R. Hepatitis C in the United States Air Force Immunodeficiency Virus Positive Cohort. Presented at the VI International Conference on AIDS, San Francisco, California, June 1990.